Effect of an endurance training-overtraining protocol on rat muscular oxidative capacity #10

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Overtraining may outcomes for functional overreaching (FOR), a short term decline in performance that leads eventually to an improvement in performance after recovery, or nonfunctional overreaching (NFOR) when performance decline may be reversed only by a longer regenerative period. Recently we developed a training-overtraining protocol for rats with increased workload: eight weeks of daily exercise sessions, followed by three weeks of increasing daily training frequency (2, 3 and 4 times) with decreasing recovery time between sessions (4, 3 and 2h), characterized by analyses of performance before training (T1) and after the 4^{th}(T2), 8^{th}(T3), 9^{th}(T4), 10^{th}(T5) and 11^{th}(T6) training weeks. All rats showed significantly increased performance at T4 and eight rats constitute the trained group (Tr). After T6, two groups were distinguishable by differences in the slope (α) of a line fitted to the individual performances at T4, T5 and T6: NFOR: $\alpha <$ -15.05Kgm and FOR: $\alpha \geq$ -15.05Kgm. Our goal was to verify the muscle's oxidative capacity of Tr, FOR and NFOR groups. Skeletal muscle mitochondrial complexes I, IV and citrate synthase (CS) activity were quantified through Histochemical-staining-BN-PAGE and spectrophotometer analysis, respectively. The area of complexes I and IV was expressed relative to the area for comassie-stained complex V. Significant decreases were found in complex IV (17.2±5.84) and CS activity (22.7±3.21U/gwet) in NFOR group when compared with Tr (35.39±11.33, 32.8±5.24U/gwet) and FOR (28.9±11.37, 31.8±2.75U/gwet). There is a relationship between NFOR and the reduction of muscle oxidative capacity. Thus, aerobic tests should be performed in training routine to monitor performance alterations preventing these situations.

Key words: overreaching; mitochondria; rats; skeletal muscle, mitochondrial complex IV, citrate synthase.